ALLIED MACHINE & ENGINEERING

Holemaking Solutions for Today's Manufacturing

Boring

Reaming

Burnishing

Threading

Specials

ASC 320®

DRILLING

High Penetration Solid Carbide Drills

North America

Allied Machine
120 Deeds Drive
Dover, OH 44622
United States

Allied Machine
485 West 3rd Street
Dover, OH 44622
United States

ThreadMills USA™
4185 Crosstowne Ct #B
Evans, GA 30809
United States

Superion®
1285 S Patton St.
Xenia, OH 45385
United States

Europe

Allied Machine Europe
93 Vantage Point
Pensnett Estate
Kingswinford
West Midlands
DY6 7FR, United Kingdom

Wohlhaupter™ GmbH
Maybachstrasse 4
Postfach 1264
72636 Frickenhausen
Germany

Asia

Wohlhaupter™ India
B-23, 2nd Floor
B Block Community Centre
Janakpuri, New Delhi - 110058
India

Allied Machine & Engineering is a worldwide leader in holemaking and finishing solutions. We are committed to providing practical and dependable solutions to our customers through innovative designs and superior customer and technical support.

We continue to expand our product offering in order to provide new and different solutions. With Field Sales Engineers located around the world, we position ourselves to provide technical support on site, right at your spindle.

ALLIED MACHINE & ENGINEERING®

www.alliedmachine.com

ALLIED MACHINE & ENGINEERING

Holemaking Solutions for Today's Manufacturing

ASC 320®

The Foundation

Since 1941, Allied Machine & Engineering has provided dependable and practical holemaking solutions to the world. What was once a small job shop in Ohio is now a worldwide leader in cutting tool technology. With three manufacturing facilities in Ohio, one in Georgia, another in Germany, and headquarters in both the United States and Europe, Allied Machine is positioned to bring innovative solutions and technical expertise directly to the customers' hands.

The Beginning

Harold E. Stokey founded Allied Machine & Engineering to aid the war effort, manufacturing taper bearing lock nuts for the production of M1 tanks. Years later, after a sales meeting gone wrong, Stokey possessed a warehouse stocked with spade drill inserts. He set forth into the industry that would become Allied Machine's thriving identity: holemaking.

The T-A®

When Harold's son, William H. Stokey, became the president and CEO, he developed the Throw Away, or T-A, spade drill insert system. The T-A revolutionized the holemaking industry, launching Allied Machine ahead of the competition. Since then, numerous innovations and advancements have been created from the T-A's inspiration.

The Innovation

Since the development of the T-A, Allied Machine has expanded its product offering to support a vast range of customer applications, including large diameter and deep hole drilling, boring, reaming, burnishing, porting, and threading.

The People

Allied Machine understands that high quality products are only one facet of success. Our customer support is crucial to what we do, and that's why we make sure the best engineers and customer service associates are in place to assist our customers around the world.

The Future

With over 75 years of experience, Allied Machine has encountered the challenges of growth and success. By investing in cutting edge technology and the brightest and sharpest minds, our knowledge and capabilities continue to expand and grow every day.

Steve Stokey
Executive Vice President

William H. Stokey
President and CEO

Mike Stokey
Executive Vice President

WOHLHAUPTER® ThreadMills USA® SUPERION® CRITERION®

Replaceable Insert Drills

- Reduce costs by decreasing setup time and utilizing a single holder for the lives of multiple inserts
- Provide flexibility to quickly switch between inserts with different geometries
- Products:
  - **GEN3SYS® XT | GEN3SYS® XT Pro**
  - **T-A® | T-A® GEN2 | T-A Pro™**
  - **High Performance | Universal**

Indexable Insert Drills

- Protect your investment and reduce your inventory with replaceable cartridges that allow the same holder to be used repeatedly
- Indexable inserts increase productivity and tool life while reducing costs
- Products:
  - **4TEX® Drill**
  - **Revolution Drill®**
  - **Opening Drill®**

Replaceable / Indexable Insert Drills

- Drill large diameter holes and maximize penetration rates even on low horsepower machines
- Delivers strength and versatility needed for any deep hole drilling application
- Holders cover a range of sizes with the replaceable heads determining the cutting diameter
- Products:
  - **APX™ Drill**

Solid Carbide Drills

- Offer greater strength and stability when drilling tougher materials
- Available in diameters from 3mm - 20mm
- Can be made-to-order specifically for your application (Superion® quoted specials)
  - **ASC 320®**
  - **Superion®**

Structural Steel Solutions

- Deliver outstanding performance and durability in structural steel applications
- Designed to produce optimal results in difficult-to-machine materials
- Available in multiple lengths and diameters
- T-A® style drills have different insert geometry options to improve performance, depending on material
- Products:
  - **T-A® | T-A® GEN2**
  - **GEN3SYS® XT Pro**

BTA (STS) Machining Solutions

- The internal ejection system flushes chips and debris from the hole with no interference to the cutting process
- Utilizes the advantages of the T-A® drill insert
- Designed to significantly increase penetration rates over brazed heads and traditional gun drills
- Products:
  - **BT-A Drill**

Hydraulic Port Contour Cutters

- Save significant time and money by performing four processes in one step
- Replaceable insert design reduces costs, inventory, and setup times
- Available in four industry specifications:
  - Imperial: SAE J-1926
  - Metric: ISO 6149-1:2006
  - Military: SAE AS5202
  - John Deere: JDS-G173.1
- Products:
  - **AccuPort 432®**

4 IN 1

Enhanced Special Drilling Capabilities

- Allied Machine engineers are available to meet with you to evaluate your application and recommend the best solution for you
- Special drilling solutions can incorporate advanced features such as adjustable diameter locations, multiple steps, additional coolant designs, special lengths and diameters, and more
- Special drills can drastically reduce your cost per hole and increase your overall productivity by eliminating multiple processes and increasing tool life

WOHLHAUPTER®
High Precision Boring Systems

- Designs available for high volume applications that increase rigidity to improve performance
- Versatile boring heads that are flexible with changing applications while maintaining excellent performance
- Provides high precision with absolute repeatability to ensure every part is held to tolerance
- Offers an industry leading modular shank connection that maintains rigidity and reduces inventory on your boring system
- Available with both digital and analog settings
- Products:
  - **Wohlhaupter™ Boring Tools**

NOTE: Adjustment accuracy of 0.0001" or 0.002mm on diameter

CRITERION®
Modular Boring Systems

- The modular capabilities are ideal for use across multiple different projects
- Offers versatile boring heads suitable for job shops and tooling rooms
- Provides an economical solution for low volume and/or short-term production applications
- Offers finish boring solutions
- Products:
  - **Criterion® Boring Tools**

S.C.A.M.I.®
Expandable Reaming Solutions

- Expandable cutting diameters accommodate for wear, which extends tool life
- Replaceable cutting heads and rings reduce waste and improve production time versus solid high speed steel and carbide reamers
- Holds tight tolerances to ensure processes are performed to accurate specifications
- Reduces tooling costs because many items are available for reconditioning
- Products:
  - **ALVAN® Reamers**

S.C.A.M.I.®
Roller Burnishing Solutions

- Produce excellent surface finishes
- Provide accurate size control
- Increase surface hardness
- Solutions for both through hole and blind hole applications
- Products:
  - **S.C.A.M.I.® Roller Burnishing Tools**

Solid Carbide Thread Mills

- Available with coolant through options
- Covers a wide range of thread forms
- Provides optimal solutions for both high production projects and short-run applications
- Products
  - **AccuThread™ 856**
  - **AccuThread™ T3**
  - **ThreadMills USA™**

Replaceable Insert Thread Mills

- Three insert lengths are available that cover a wide range of thread forms
- Holders can utilize inserts with different pitches and thread forms
- Repeatability is achieved by both the bolt-in style and the pin style locking systems
- Increases tool life by 25 - 50% with Allied Machine's AM210® coating
- Products
  - **AccuThread™ 856: Bolt-in Style**
  - **AccuThread™ 856: Pin Style**

SPECIAL CAPABILITIES

When it comes to designing and developing special solutions for customers, Allied Machine is the top choice. If your application requires special tooling, give us a call. Our engineered specials are developed by the brightest engineers in the industry. Most of our standard tooling can be altered as specials, or we can create entirely new concepts for particularly unique applications.

One special tooling solution is Insta-Quote®, the online system that allows you to design your own special tooling 24/7. Receive a quote and drawings within minutes just by following the steps.

And with the addition of Superion® technology and capabilities, we can customize made-to-order solid carbide tools to achieve optimal results for your applications.

Whatever your application, Allied Machine has the answer.

Insta-Quote®

SUPERION®

ToolMD™

Increase the production and success of your applications today.

- Direct access to 2D drawings and 3D models
- Assemble and view tool images in your browser
- Download drawings for use in most machining software programs
- Browse products, search item numbers, and save assemblies for future use

toolmd.com

WOHLHAUPTER® Boring Insert Selector

Find the best insert for your application.

- Generate the correct boring insert for your job in just six easy steps
- Choose type, shape, substrate, insert form, nose radius, and material
- Order easily by adding the item to your cart

alliedmachine.com/bis

Product Selector

Use the product selector to find the right tool for your application.

- Follow guided steps to generate the right tool for your application
- Learn about your recommended tool and how to maximize its performance

alliedmachine.com/productselector

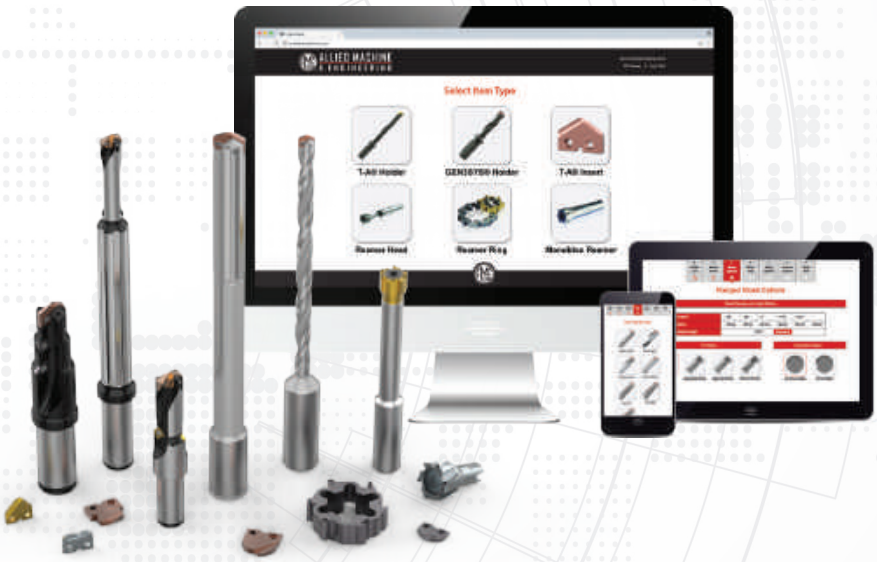
Insta-Code®

Eliminate the wait. Get your program now.

- Choose the best thread mill for your application
- Create program code for your machine
- Available as a PC download app (that can be used offline)
- Website app available 24/7

Insta-Code also has a
Cycle Time Calculator

alliedmachine.com/InstaCode



Insta-Quote®

Design your custom tooling and receive a drawing and quote...all within minutes.

- Design and quote your own tooling
- Generate the solution you need in just a few steps
- Features the following products
  - **T-A® Inserts**
  - **T-A® Holders**
  - **GEN3SYS® XT Holders**
  - **ALVAN® Reamers**

iq.alliedmachine.com

Solution Hub App

All Allied all the time.

- Quickly look up product information
- Links to our free online tools
- Locate distributors
- Stay up to date on news and events

Google play
Available on the App Store

Machinist Tool App

Quickly convert cutting tool parameters for the machine inputs you need.

- Input data to calculate the RPM and speed and feed rates
- Also features the Boring Insert Selector
- Access product literature right at your fingertips

Google play
Available on the App Store

ASC 320®

High Penetration Solid Carbide Drilling System

- **Diameter Range:** 0.1181" - 0.7874" (3.00mm - 20.00mm)

Beyond the Cutting Edge

The ASC 320 range of solid carbide high penetration drills has been specifically engineered to deliver high productivity in difficult-to-machine materials, including stainless steels, Inconel, Hastelloy, and Titanium.

The unique combination of cutting edge geometry and high performance coatings provides excellent chip control, hole quality, and extended tool life, making ASC 320 ideal for use in a wide range of challenging applications and market sectors.

Extended tool life	3.5xD, 6xD, and 9xD	Excellent chip control

Applicable Industries

Aerospace | Agriculture | Automotive | Firearms | General Machining | Oil & Gas | Renewable Energy

Your safety and the safety of others is very important. This catalog contains important safety messages. Always read and follow all safety precautions.

This triangle is a safety hazard symbol. It alerts you to potential safety hazards that can cause tool failure and serious injury.

When you see this symbol in the catalog, look for a related safety message that may be near this triangle or referred to in the nearby text.

There are safety signal words also used in the catalog. Safety messages follow these words.

⚠ WARNING

WARNING (shown above) means that failure to follow the precautions in this message could result in tool failure and serious injury.

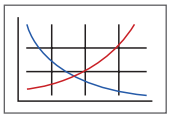
NOTICE means that failure to follow the precautions in this message could result in damage to the tool or machine but not result in personal injury.

NOTE and **IMPORTANT** are also used. These are important that you read and follow but are not safety-related.

Visit www.alliedmachine.com for the most up-to-date information and procedures.

Reference Icons
The following icons will appear throughout the catalog to help you navigate between products.

Setup / Assembly Information
Detailed instructions and information regarding the corresponding part(s)



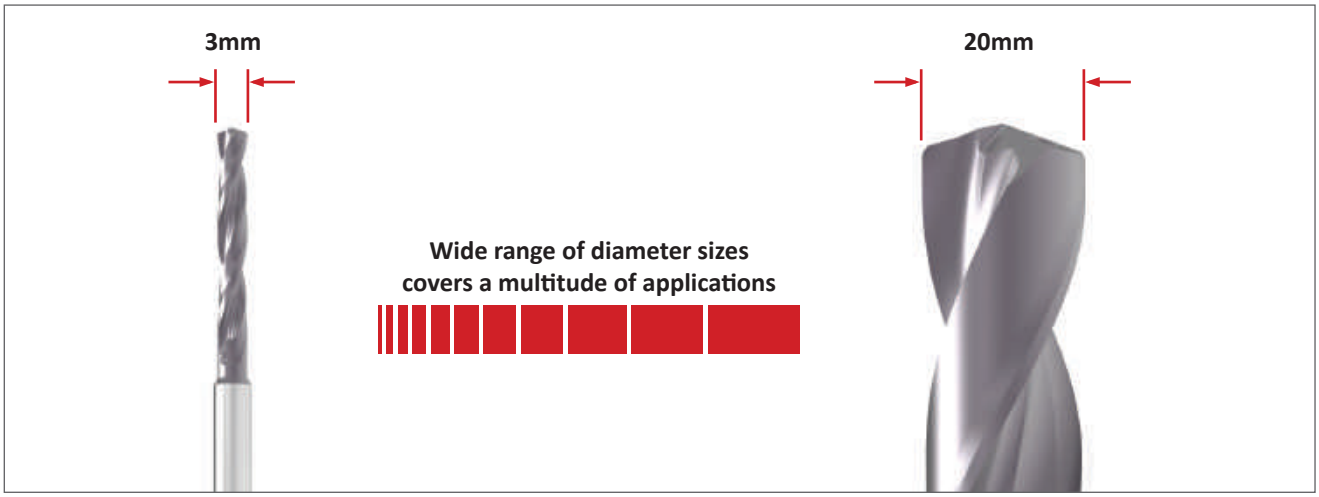
Recommended Cutting Data
Speed and feed recommendations for optimum and safe drilling

ASC 320® Drilling System Contents

Product Overview

The Advantages

- ***Ideal for a wide variety of applications***
  with the unique geometry and coating combination
- ***Increased stability***
  with the reinforced shank
- ***Increased tool life***
- ***Excellent chip control***
- ***Through coolant design***
- ***Available in 3.5xD, 6xD, and 9xD lengths***



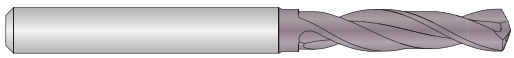
P Steel N/mm² <1365	S High Temp Materials N/mm² <1365	M Stainless Steel N/mm² <940	H Hardened Materials N/mm² <1365	K Cast and Ductile Iron N/mm² <1020	N Non-Ferrous Materials N/mm² <855
◆	◆	◆	❖	❖	❖

◆ First choice
❖ Second choice

Product Nomenclature

ASC 320 Solid Carbide Drills

3	60	M	07500	A21	M
1	2	3	4	5	6



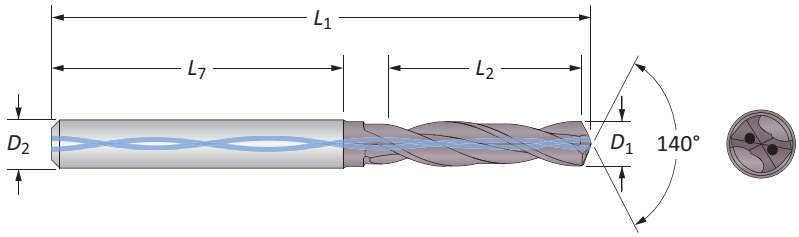
1. ASC 320®	2. Length	3. Style	4. Diameter	5. Substrate Geometry	6. Multi-Layer Coating
3 = Solid carbide	**35** = 3.5xD **60** = 6xD **90** = 9xD	**E** = English (Imperial) **M** = Metric	**07500** = 0.7500"	**A21** = Standard	**M** = TiAlN

Regrind and Recoating

The ASC 320 drills are ground and recoated by Allied Machine to maintain the high level of performance achieved with these tools. Using our services assures the best tool performance is maintained in your production process.

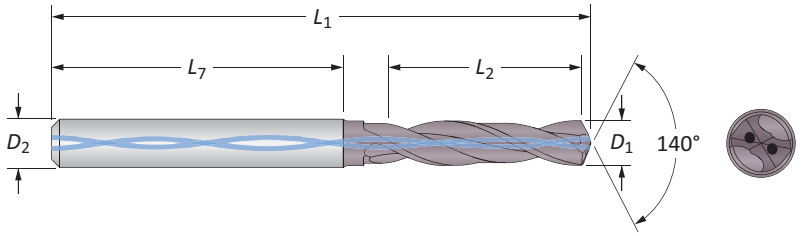
Reference Key

Symbol	Attribute
D_1	Drill diameter
D_2	Shank diameter
L_1	Overall length
L_2	Drill depth
L_7	Shank length



Solid Carbide Drills

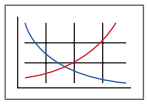
3.5xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1 Fractional Equivalent	D_1 inch	D_1 mm	Tap Size*	Body L_2 inch	Body L_2 mm	Body L_1 inch	Body L_1 mm	Shank L_7 mm	Shank D_2 mm	Part No.
1/8	0.1250	3.17	–	0.551	14	2.47	62.7	36	4	**335E01250A21M**
–	0.1575	4.00	–	0.551	14	2.47	62.7	36	4	**335M04000A21M**
–	0.1654	4.20	M5x0.8	0.827	21	2.64	67.1	36	6	**335M04200A21M**
11/64	0.1719	4.37	–	0.827	21	2.64	67.1	36	6	**335E01719A21M**
#16	0.1772	4.50	#12-24	0.827	21	2.64	67.1	36	6	**335M04500A21M**
–	0.1811	4.60	#12-28	0.827	21	2.64	67.1	36	6	**335M04600A21M**
3/16	0.1875	4.76	–	0.827	21	2.64	67.1	36	6	**335E01875A21M**
–	0.1969	5.00	M6x1	0.827	21	2.64	67.1	36	6	**335M05000A21M**
13/64	0.2031	5.16	–	0.827	21	2.64	67.1	36	6	**335E02031A21M**
7/32	0.2188	5.56	–	0.827	21	2.64	67.1	36	6	**335E02188A21M**
#1	0.2280	5.79	–	0.827	21	2.64	67.1	36	6	**335E02280A21M**
15/64	0.2344	5.95	–	0.827	21	2.64	67.1	36	6	**335E02344A21M**
–	0.2362	6.00	M7x1	0.827	21	2.64	67.1	36	6	**335M06000A21M**
1/4	0.2500	6.35	–	1.102	28	3.13	79.4	36	8	**335E02500A21M**
–	0.2559	6.50	–	1.102	28	3.13	79.4	36	8	**335M06500A21M**
17/64	0.2656	6.75	M8x1.25	1.102	28	3.13	79.4	36	8	**335E02656A21M**
–	0.2756	7.00	M8x1	1.102	28	3.13	79.4	36	8	**335M07000A21M**
9/32	0.2812	7.14	–	1.102	28	3.13	79.4	36	8	**335E02812A21M**
–	0.2874	7.30	–	1.102	28	3.13	79.4	36	8	**335M07300A21M**
–	0.2953	7.50	–	1.102	28	3.13	79.4	36	8	**335M07500A21M**
19/64	0.2969	7.54	–	1.102	28	3.13	79.4	36	8	**335E02969A21M**
–	0.3071	7.80	–	1.102	28	3.13	79.4	36	8	**335M07800A21M**
5/16	0.3125	7.94	3/8-16	1.102	28	3.13	79.4	36	8	**335E03125A21M**
–	0.3150	8.00	–	1.102	28	3.13	79.4	36	8	**335M08000A21M**
21/64	0.3281	8.33	–	1.378	35	3.57	90.7	40	10	**335E03281A21M**
Q	0.3320	8.43	3/8-24	1.378	35	3.57	90.7	40	10	**335E03320A21M**
–	0.3346	8.50	M10.1.5	1.378	35	3.57	90.7	40	10	**335M08500A21M**
11/32	0.3438	8.73	–	1.378	35	3.57	90.7	40	10	**335E03438A21M**
–	0.3465	8.80	–	1.378	35	3.57	90.7	40	10	**335M08800A21M**
–	0.3543	9.00	–	1.378	35	3.57	90.7	40	10	**335M09000A21M**
23/64	0.3594	9.13	–	1.378	35	3.57	90.7	40	10	**335E03594A21M**
U	0.3680	9.35	7/16-14	1.378	35	3.57	90.7	40	10	**335E03680A21M**
–	0.3740	9.50	–	1.378	35	3.57	90.7	40	10	**335M09500A21M**
3/8	0.3750	9.53	–	1.378	35	3.57	90.7	40	10	**335E03750A21M**
–	0.3858	9.80	–	1.378	35	3.57	90.7	40	10	**335E03858A21M**
25/64	0.3906	9.92	7/16-20	1.378	35	3.57	90.7	40	10	**335E03906A21M**
–	0.3937	10.00	–	1.378	35	3.57	90.7	40	10	**335M10000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14
Key on A10: 1



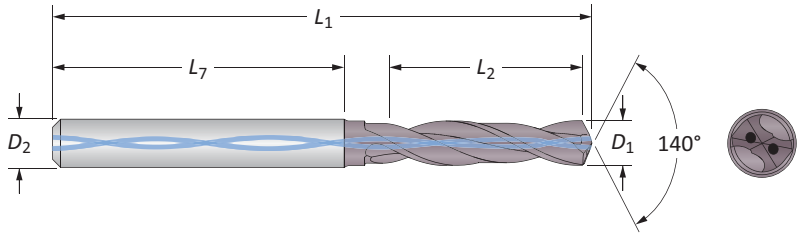
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450”	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Solid Carbide Drills

3.5xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1				Body				Shank		
Fractional Equivalent	inch	mm	Tap Size*	L_2 inch	L_2 mm	L_1 inch	L_1 mm	L_7 mm	D_2 mm	Part No.
–	0.4016	10.20	M12x1.75	1.654	42	4.18	106.1	45	12	**335M10200A21M**
13/32	0.4062	10.32	–	1.378	42	4.18	106.1	45	12	**335E04062A21M**
–	0.4134	10.50	–	1.378	42	4.18	106.1	45	12	**335M10500A21M**
27/64	0.4219	10.72	1/2-13	1.654	42	4.18	106.1	45	12	**335E04219A21M**
–	0.4331	11.00	–	1.654	42	4.18	106.1	45	12	**335M11000A21M**
7/16	0.4375	11.11	–	1.654	42	4.18	106.1	45	12	**335E04375A21M**
–	0.4528	11.50	–	1.654	42	4.18	106.1	45	12	**335M11500A21M**
29/64	0.4531	11.51	1/2-20	1.654	42	4.18	106.1	45	12	**335E04531A21M**
15/32	0.4688	11.91	–	1.654	42	4.18	106.1	45	12	**335E04688A21M**
–	0.4724	12.00	M14x2	1.654	42	4.18	106.1	45	12	**335M12000A21M**
31/64	0.4844	12.30	9/16-12	1.929	49	4.55	115.6	45	14	**335E04844A21M**
–	0.4921	12.50	M14x1.5	1.929	49	4.55	115.6	45	14	**335M12500A21M**
1/2	0.5000	12.70	–	1.929	49	4.55	115.6	45	14	**335E05000A21M**
–	0.5118	13.00	–	1.929	49	4.55	115.6	45	14	**335M13000A21M**
33/64	0.5156	13.10	9/16-18	1.929	49	4.55	115.6	45	14	**335E05156A21M**
17/32	0.5312	13.49	5/8-11	1.929	49	4.55	115.6	45	14	**335E05312A21M**
–	0.5315	13.50	–	1.929	49	4.55	115.6	45	14	**335M13500A21M**
–	0.5394	13.70	–	1.929	49	4.55	115.6	45	14	**335M13700A21M**
35/64	0.5469	13.89	5/8-12	1.929	49	4.55	115.6	45	14	**335E05469A21M**
–	0.5512	14.00	M16x2	1.929	49	4.55	115.6	45	14	**335M14000A21M**
9/16	0.5625	14.29	–	2.205	56	5.07	128.8	48	16	**335E05625A21M**
–	0.5709	14.50	M16x1.5	2.205	56	5.07	128.8	48	16	**335M14500A21M**
37/64	0.5781	14.68	5/8-18	2.205	56	5.07	128.8	48	16	**335E05781A21M**
–	0.5906	15.00	–	2.205	56	5.07	128.8	48	16	**335M15000A21M**
19/32	0.5938	15.08	–	2.205	56	5.07	128.8	48	16	**335E05938A21M**
39/64	0.6094	15.48	11/16-12	2.205	56	5.07	128.8	48	16	**335E06094A21M**
–	0.6102	15.50	M18x2.5	2.205	56	5.07	128.8	48	16	**335M15500A21M**
5/8	0.6250	15.88	–	2.205	56	5.07	128.8	48	16	**335E06250A21M**
–	0.6299	16.00	–	2.205	56	5.07	128.8	48	16	**335M16000A21M**
–	0.6496	16.50	M18x1.5	2.480	63	5.44	138.2	48	18	**335M16500A21M**
21/32	0.6563	16.67	3/4-10	2.480	63	5.44	138.2	48	18	**335E06563A21M**
–	0.6693	17.00	–	2.480	63	5.44	138.2	48	18	**335M17000A21M**
43/64	0.6719	17.07	3/4-12	2.480	63	5.44	138.2	48	18	**335E06719A21M**
11/16	0.6875	17.46	3/4-16	2.480	63	5.44	138.2	48	18	**335E06875A21M**
–	0.6890	17.50	M20x2.5	2.480	63	5.44	138.2	48	18	**335M17500A21M**
45/64	0.7031	17.86	–	2.480	63	5.44	138.2	48	18	**335E07031A21M**
–	0.7087	18.00	–	2.480	63	5.44	138.2	48	18	**335M18000A21M**
–	0.7283	18.50	M20x1.5	2.756	70	5.89	149.5	50	20	**335M18500A21M**
47/64	0.7344	18.65	–	2.756	70	5.89	149.5	50	20	**335E07344A21M**
–	0.7480	19.00	–	2.756	70	5.89	149.5	50	20	**335M19000A21M**
–	0.7580	19.25	–	2.756	70	5.89	149.5	50	20	**335E07580A21M**
–	0.7677	19.50	M22x2.5	2.756	70	5.89	149.5	50	20	**335M19500A21M**
25/32	0.7813	19.84	–	2.756	70	5.89	149.5	50	20	**335E07813A21M**
–	0.7874	20.00	–	2.756	70	5.89	149.5	50	20	**335M20000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

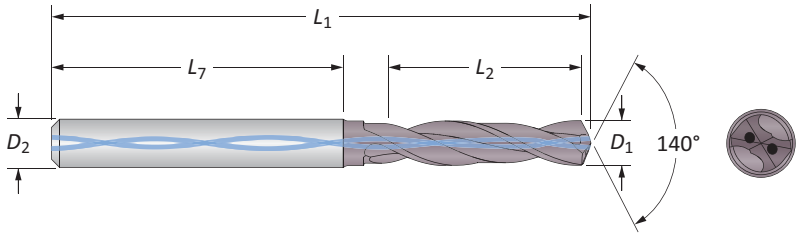
Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450"	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

A10: 12 - 14
Key on A10: 1
A10: 2

Solid Carbide Drills

6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1				Body				Shank		
Fractional Equivalent	inch	mm	Tap Size*	L_2 inch	L_2 mm	L_1 inch	L_1 mm	L_7 mm	D_2 mm	Part No.
–	0.1181	3.00	–	0.9450	24	2.86	72.7	36	4	**360M03000A21M**
1/8	0.1250	3.18	–	0.9450	24	2.86	72.7	36	4	**360E01250A21M**
–	0.1260	3.20	–	0.9450	24	2.86	72.7	36	4	**360M03200A21M**
–	0.1299	3.30	M4x0.7	0.9450	24	2.86	72.7	36	4	**360M03300A21M**
–	0.1378	3.50	–	0.9450	24	2.86	72.7	36	4	**360M03500A21M**
9/64	0.1406	3.57	–	0.9450	24	2.86	72.7	36	4	**360E01406A21M**
#25	0.1496	3.80	#10-24	0.9450	24	2.86	72.7	36	4	**360M03800A21M**
5/32	0.1563	3.97	–	0.9450	24	2.86	72.7	36	4	**360E01563A21M**
–	0.1575	4.00	–	0.9450	24	2.86	72.7	36	4	**360M04000A21M**
–	0.1654	4.20	M5x0.8	1.1417	36	3.27	83.1	36	6	**360M04200A21M**
11/64	0.1719	4.37	–	1.1417	36	3.27	83.1	36	6	**360E01719A21M**
#16	0.1772	4.50	#12-24	1.1417	36	3.27	83.1	36	6	**360M04500A21M**
–	0.1811	4.60	#12-28	1.1417	36	3.27	83.1	36	6	**360M04600A21M**
–	0.1831	4.65	–	1.1417	36	3.27	83.1	36	6	**360M04650A21M**
3/16	0.1875	4.76	–	1.1417	36	3.27	83.1	36	6	**360E01875A21M**
–	0.1950	4.95	–	1.1417	36	3.27	83.1	36	6	**360M04950A21M**
–	0.1969	5.00	M6x1	1.1417	36	3.27	83.1	36	6	**360M05000A21M**
#8	0.1990	5.05	–	1.1417	36	3.27	83.1	36	6	**360E01990A21M**
#7	0.2010	5.11	1/4-20	1.1417	36	3.27	83.1	36	6	**360E02010A21M**
13/64	0.2031	5.16	–	1.1417	36	3.27	83.1	36	6	**360E02031A21M**
–	0.2098	5.33	–	1.1417	36	3.27	83.1	36	6	**360M05330A21M**
#3	0.2130	5.41	1/4-28	1.1417	36	3.27	83.1	36	6	**360E02130A21M**
–	0.2165	5.50	–	1.1417	36	3.27	83.1	36	6	**360M05500A21M**
7/32	0.2188	5.56	–	1.1417	36	3.27	83.1	36	6	**360E02188A21M**
#1	0.2280	5.79	–	1.1417	36	3.27	83.1	36	6	**360E02280A21M**
–	0.2299	5.84	–	1.1417	36	3.27	83.1	36	6	**360M05840A21M**
15/64	0.2344	5.95	–	1.1417	36	3.27	83.1	36	6	**360E02344A21M**
–	0.2362	6.00	M7x1	1.1417	36	3.27	83.1	36	6	**360M06000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

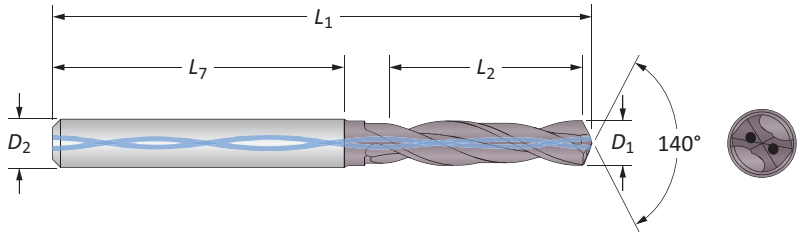
A10: 12 - 14
Key on A10: 1
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450”	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Solid Carbide Drills

6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1 Fractional Equivalent	D_1 inch	D_1 mm	Tap Size*	Body L_2 inch	Body L_2 mm	Body L_1 inch	Body L_1 mm	Shank L_7 mm	Shank D_2 mm	Part No.
–	0.2398	6.09	–	1.8900	48	4.31	109.4	36	8	**360M06090A21M**
D	0.2460	6.25	–	1.8900	48	4.31	109.4	36	8	**360E02460A21M**
1/4	0.2500	6.35	–	1.8900	48	4.31	109.4	36	8	**360E02500A21M**
–	0.2559	6.50	–	1.8900	48	4.31	109.4	36	8	**360M06500A21M**
F	0.2570	6.53	5/16-18	1.8900	48	4.31	109.4	36	8	**360E02570A21M**
17/64	0.2656	6.75	M8x1.25	1.8900	48	4.31	109.4	36	8	**360E02656A21M**
–	0.2677	6.80	–	1.8900	48	4.31	109.4	36	8	**360M06800A21M**
I	0.2720	6.91	5/16-24	1.8900	48	4.31	109.4	36	8	**360E02720A21M**
–	0.2756	7.00	M8x1	1.8900	48	4.31	109.4	36	8	**360M07000A21M**
–	0.2795	7.10	–	1.8900	48	4.31	109.4	36	8	**360M07100A21M**
9/32	0.2812	7.14	–	1.8900	48	4.31	109.4	36	8	**360E02812A21M**
–	0.2874	7.30	–	1.8900	48	4.31	109.4	36	8	**360M07300A21M**
–	0.2913	7.40	–	1.8900	48	4.31	109.4	36	8	**360M07400A21M**
–	0.2953	7.50	–	1.890	48	4.31	109.4	36	8	**360M07500A21M**
19/64	0.2969	7.54	–	1.890	48	4.31	109.4	36	8	**360E02969A21M**
5/16	0.3125	7.94	3/8-16	1.890	48	4.31	109.4	36	8	**360E03125A21M**
–	0.3150	8.00	–	1.890	48	4.31	109.4	36	8	**360M08000A21M**
21/64	0.3281	8.33	–	2.362	60	4.56	115.4	40	10	**360E03281A21M**
Q	0.3320	8.43	3/8-24	2.362	60	4.56	115.4	40	10	**360M08430A21M**
–	0.3346	8.50	M10x1.5	2.362	60	4.56	115.4	40	10	**360M08500A21M**
–	0.3386	8.60	–	2.362	60	4.56	115.4	40	10	**360M08600A21M**
11/32	0.3438	8.73	–	2.362	60	4.56	115.4	40	10	**360E03438A21M**
–	0.3465	8.80	–	2.362	60	4.56	115.4	40	10	**360M08800A21M**
–	0.3543	9.00	–	2.362	60	4.56	115.4	40	10	**360M09000A21M**
23/64	0.3594	9.13	–	2.362	60	4.56	115.4	40	10	**360E03594A21M**
–	0.3622	9.20	–	2.362	60	4.56	115.4	40	10	**360M09200A21M**
U	0.3680	9.35	7/16-14	2.362	60	4.56	115.4	40	10	**360E03680A21M**
–	0.3730	9.47	–	2.362	60	4.56	115.4	40	10	**360M09470A21M**
–	0.3740	9.50	–	2.362	60	4.56	115.4	40	10	**360M09500A21M**
3/8	0.3750	9.53	–	2.362	60	4.56	115.4	40	10	**360E03750A21M**
–	0.3780	9.60	–	2.362	60	4.56	115.4	40	10	**360M09600A21M**
–	0.3820	9.70	–	2.362	60	4.56	115.4	40	10	**360M09700A21M**
25/64	0.3906	9.92	7/16-20	2.362	60	4.56	115.4	40	10	**360E03906A21M**
–	0.3937	10.00	–	2.362	60	4.56	115.4	40	10	**360M10000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

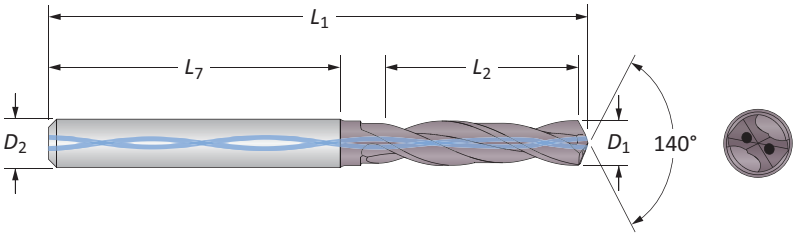
A10: 12 - 14
Key on A10: 1
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450”	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Solid Carbide Drills

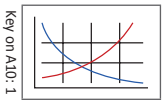
6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1 Fractional Equivalent	D_1 inch	D_1 mm	Tap Size*	Body L_2 inch	Body L_2 mm	Body L_1 inch	Body L_1 mm	Shank L_7 mm	Shank D_2 mm	Part No.
–	0.4016	10.20	M12x1.75	2.835	72	5.36	136.2	45	12	**360M10200A21M**
Y	0.4040	10.31	–	2.835	72	5.36	136.2	45	12	**360E04040A21M**
13/32	0.4062	10.32	–	2.835	72	5.36	136.2	45	12	**360E04062A21M**
–	0.4134	10.50	–	2.835	72	5.36	136.2	45	12	**360M10500A21M**
27/64	0.4219	10.72	1/2-13	2.835	72	5.36	136.2	45	12	**360E04219A21M**
–	0.4252	10.80	M12x4.25	2.835	72	5.36	136.2	45	12	**360M10800A21M**
–	0.4290	10.90	–	2.835	72	5.36	136.2	45	12	**360M10900A21M**
–	0.4331	11.00	–	2.835	72	5.36	136.2	45	12	**360M11000A21M**
7/16	0.4375	11.11	–	2.835	72	5.36	136.2	45	12	**360E04375A21M**
–	0.4409	11.20	–	2.835	72	5.36	136.2	45	12	**360M11200A21M**
–	0.4528	11.50	–	2.835	72	5.36	136.2	45	12	**360M11500A21M**
29/64	0.4531	11.51	1/2-20	2.835	72	5.36	136.2	45	12	**360E04531A21M**
–	0.4646	11.80	–	2.835	72	5.36	136.2	45	12	**360M11800A21M**
15/32	0.4688	11.91	–	2.835	72	5.36	136.2	45	12	**360E04688A21M**
–	0.4724	12.00	M14x2	2.835	72	5.36	136.2	45	12	**360M12000A21M**
31/64	0.4844	12.30	9/16-12	3.307	84	5.93	150.5	45	14	**360E04844A21M**
–	0.4921	12.50	M14x1.5	3.307	84	5.93	150.5	45	14	**360M12500A21M**
1/2	0.5000	12.70	–	3.307	84	5.93	150.5	45	14	**360E05000A21M**
–	0.5100	12.95	–	3.307	84	5.93	150.5	45	14	**360M12950A21M**
–	0.5118	13.00	–	3.307	84	5.93	150.5	45	14	**360M13000A21M**
33/64	0.5156	13.10	9/16-18	3.307	84	5.93	150.5	45	14	**360E05156A21M**
–	0.5197	13.20	–	3.307	84	5.93	150.5	45	14	**360M13200A21M**
17/32	0.5312	13.49	5/8-11	3.307	84	5.93	150.5	45	14	**360E05312A21M**
–	0.5315	13.50	–	3.307	84	5.93	150.5	45	14	**360M13500A21M**
–	0.5433	13.80	–	3.307	84	5.93	150.5	45	14	**360M13800A21M**
35/64	0.5469	13.89	5/8-12	3.307	84	5.93	150.5	45	14	**360E05469A21M**
–	0.5512	14.00	M16x2	3.307	84	5.93	150.5	45	14	**360M14000A21M**
9/16	0.5625	14.29	–	3.780	96	6.65	168.9	48	16	**360E05625A21M**
–	0.5709	14.50	M16x1.5	3.780	96	6.65	168.9	48	16	**360M14500A21M**
37/64	0.5781	14.68	5/8-18	3.780	96	6.65	168.9	48	16	**360E05781A21M**
–	0.5906	15.00	–	3.780	96	6.65	168.9	48	16	**360M15000A21M**
19/32	0.5938	15.08	–	3.780	96	6.65	168.9	48	16	**360E05938A21M**
39/64	0.6094	15.48	11/16-12	3.780	96	6.65	168.9	48	16	**360E06094A21M**
–	0.6102	15.50	M18x2.5	3.780	96	6.65	168.9	48	16	**360M15500A21M**
5/8	0.6250	15.88	–	3.780	96	6.65	168.9	48	16	**360E06250A21M**
–	0.6299	16.00	–	3.780	96	6.65	168.9	48	16	**360M16000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14
Key on A10: 1



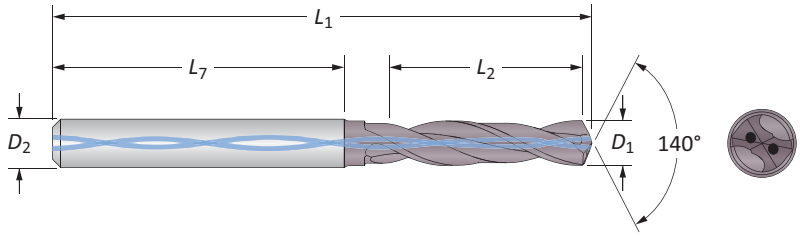
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450”	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Solid Carbide Drills

6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1				Body				Shank		
Fractional Equivalent	inch	mm	Tap Size*	L_2 inch	L_2 mm	L_1 inch	L_1 mm	L_7 mm	D_2 mm	Part No.
–	0.6307	16.02	–	4.252	108	7.22	183.3	48	18	**360M16020A21M**
–	0.6331	16.08	–	4.252	108	7.22	183.3	48	18	**360M16080A21M**
–	0.6378	16.20	–	4.252	108	7.22	183.3	48	18	**360M16200A21M**
41/64	0.6406	16.27	–	4.252	108	7.22	183.3	48	18	**360E06406A21M**
–	0.6496	16.50	M18x1.5	4.252	108	7.22	183.3	48	18	**360M16500A21M**
21/32	0.6563	16.67	3/4-10	4.252	108	7.22	183.3	48	18	**360E06563A21M**
–	0.6693	17.00	–	4.252	108	7.22	183.3	48	18	**360M17000A21M**
43/64	0.6719	17.07	3/4-12	4.252	108	7.22	183.3	48	18	**360E06719A21M**
11/16	0.6875	17.46	3/4-16	4.252	108	7.22	183.3	48	18	**360E06875A21M**
–	0.6890	17.50	M20x2.5	4.252	108	7.22	183.3	48	18	**360M17500A21M**
45/64	0.7031	17.86	–	4.252	108	7.22	183.3	48	18	**360E07031A21M**
–	0.7087	18.00	–	4.252	108	7.22	183.3	48	18	**360M18000A21M**
–	0.7098	18.03	–	4.724	120	7.86	199.6	50	20	**360M18030A21M**
23/32	0.7188	18.26	–	4.724	120	7.86	199.6	50	20	**360E07188A21M**
–	0.7283	18.50	M20x1.5	4.724	120	7.86	199.6	50	20	**360M18500A21M**
47/64	0.7344	18.65	–	4.724	120	7.86	199.6	50	20	**360E07344A21M**
–	0.7480	19.00	–	4.724	120	7.86	199.6	50	20	**360M19000A21M**
3/4	0.7500	19.05	–	4.724	120	7.86	199.6	50	20	**360E07500A21M**
–	0.7520	19.10	–	4.724	120	7.86	199.6	50	20	**360M19100A21M**
–	0.7535	19.14	–	4.724	120	7.86	199.6	50	20	**360M19140A21M**
–	0.7543	19.16	–	4.724	120	7.86	199.6	50	20	**360M19160A21M**
–	0.7559	19.20	–	4.724	120	7.86	199.6	50	20	**360M19200A21M**
–	0.7580	19.25	–	4.724	120	7.86	199.6	50	20	**360E07580A21M**
–	0.7598	19.30	–	4.724	120	7.86	199.6	50	20	**360M19300A21M**
49/64	0.7656	19.45	7/8-9	4.724	120	7.86	199.6	50	20	**360E07656A21M**
–	0.7677	19.50	M22x2.5	4.724	120	7.86	199.6	50	20	**360M19500A21M**
25/32	0.7813	19.84	–	4.724	120	7.86	199.6	50	20	**360E07813A21M**
–	0.7874	20.00	–	4.724	120	7.86	199.6	50	20	**360M20000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

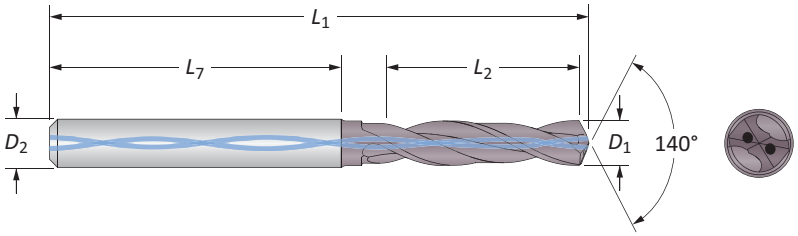
A10: 12 - 14
Key on A10: 1
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450"	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Solid Carbide Drills

9xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1				Body				Shank		
Fractional Equivalent	inch	mm	Tap Size*	L_2 inch	L_2 mm	L_1 inch	L_1 mm	L_7 mm	D_2 mm	Part No.
–	0.1969	5.00	M6x1	2.126	54	3.98	101.1	36	6	**390M05000A21M**
–	0.2362	6.00	M7x1	2.126	54	3.98	101.1	36	6	**390M06000A21M**
D	0.2461	6.25	–	2.835	72	4.86	123.4	36	8	**390E02461A21M**
1/4	0.2500	6.35	–	2.835	72	4.86	123.4	36	8	**390E02500A21M**
–	0.2559	6.50	–	2.835	72	4.86	123.4	36	8	**390M06500A21M**
17/64	0.2656	6.75	M8x1.25	2.835	72	4.86	123.4	36	8	**390E02656A21M**
I	0.2720	6.91	5/16-24	2.835	72	4.86	123.4	36	8	**390E02720A21M**
–	0.2756	7.00	M8x1	2.835	72	4.86	123.4	36	8	**390M07000A21M**
–	0.2953	7.50	–	2.835	72	4.86	123.4	36	8	**390M07500A21M**
19/64	0.2969	7.54	–	2.835	72	4.86	123.4	36	8	**390E02969A21M**
5/16	0.3125	7.94	3/8-16	2.835	72	4.86	123.4	36	8	**390E03125A21M**
–	0.3150	8.00	–	2.835	72	4.86	123.4	36	8	**390M08000A21M**
21/64	0.3281	8.33	–	3.543	90	5.74	145.8	40	10	**390E03281A21M**
Q	0.3319	8.43	3/8-24	3.543	90	5.74	145.8	40	10	**390M08430A21M**
–	0.3346	8.50	M10x1.5	3.543	90	5.74	145.8	40	10	**390M08500A21M**
–	0.3386	8.60	–	3.543	90	5.74	145.8	40	10	**390M08600A21M**
11/32	0.3438	8.73	–	3.543	90	5.74	145.8	40	10	**390E03438A21M**
–	0.3465	8.80	–	3.543	90	5.74	145.8	40	10	**390M08800A21M**
–	0.3543	9.00	–	3.543	90	5.74	145.8	40	10	**390M09000A21M**
23/64	0.3594	9.13	–	3.543	90	5.74	145.8	40	10	**390E03594A21M**
U	0.3680	9.35	7/16-14	3.543	90	5.74	145.8	40	10	**390E03680A21M**
–	0.3740	9.50	–	3.543	90	5.74	145.8	40	10	**390M09500A21M**
3/8	0.3750	9.53	–	3.543	90	5.74	145.8	40	10	**390E03750A21M**
–	0.3780	9.60	–	3.543	90	5.74	145.8	40	10	**390M09600A21M**
25/64	0.3906	9.92	7/16-20	3.543	90	5.74	145.8	40	10	**390E03906A21M**
–	0.3937	10.00	–	3.543	90	5.74	145.8	40	10	**390M10000A21M**
–	0.4016	10.20	M12x1.75	4.252	108	6.78	172.2	45	12	**390M10200A21M**
–	0.4040	10.26	–	4.252	108	6.78	172.2	45	12	**390E04040A21M**
13/32	0.4062	10.32	–	4.252	108	6.78	172.2	45	12	**390E04062A21M**
–	0.4134	10.50	–	4.252	108	6.78	172.2	45	12	**390M10500A21M**
27/64	0.4219	10.72	1/2-13	4.252	108	6.78	172.2	45	12	**390E04219A21M**
–	0.4331	11.00	–	4.252	108	6.78	172.2	45	12	**390M11000A21M**
7/16	0.4375	11.11	–	4.252	108	6.78	172.2	45	12	**390E04375A21M**
–	0.4528	11.50	–	4.252	108	6.78	172.2	45	12	**390M11500A21M**
29/64	0.4531	11.51	1/2-20	4.252	108	6.78	172.2	45	12	**390E04531A21M**
15/32	0.4688	11.91	–	4.252	108	6.78	172.2	45	12	**390E04688A21M**
–	0.4724	12.00	M14x2	4.252	108	6.78	172.2	45	12	**390M12000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14
Key on A10: 1

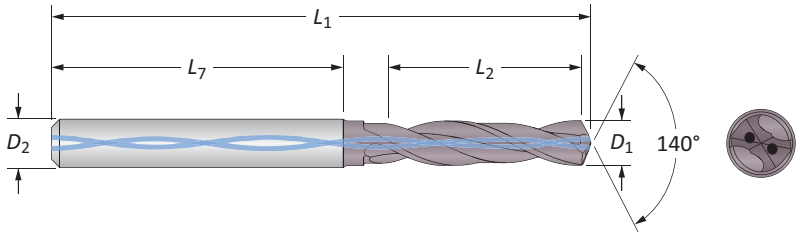
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450"	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Solid Carbide Drills

9xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



D_1				Body				Shank		
Fractional Equivalent	inch	mm	Tap Size*	L_2 inch	L_2 mm	L_1 inch	L_1 mm	L_7 mm	D_2 mm	Part No.
31/64	0.4844	12.30	9/16-12	4.961	126	7.58	192.5	45	14	**390E04844A21M**
–	0.4921	12.50	M14x1.5	4.961	126	7.58	192.5	45	14	**390M12500A21M**
1/2	0.5000	12.70	–	4.961	126	7.58	192.5	45	14	**390E05000A21M**
–	0.5118	13.00	–	4.961	126	7.58	192.5	45	14	**390M13000A21M**
33/64	0.5156	13.10	9/16-18	4.961	126	7.58	192.5	45	14	**390E05156A21M**
17/32	0.5312	13.49	5/8-11	4.961	126	7.58	192.5	45	14	**390E05312A21M**
–	0.5315	13.50	–	4.961	126	7.58	192.5	45	14	**390M13500A21M**
35/64	0.5469	13.89	5/8-12	4.961	126	7.58	192.5	45	14	**390E05469A21M**
–	0.5512	14.00	M16x2	4.961	126	7.58	192.5	45	14	**390M14000A21M**
9/16	0.5625	14.29	–	5.669	144	8.54	216.9	48	16	**390E05625A21M**
–	0.5709	14.50	M16x1.5	5.669	144	8.54	216.9	48	16	**390M14500A21M**
37/64	0.5781	14.68	5/8-18	5.669	144	8.54	216.9	48	16	**390E05781A21M**
–	0.5906	15.00	–	5.669	144	8.54	216.9	48	16	**390M15000A21M**
19/32	0.5938	15.08	–	5.669	144	8.54	216.9	48	16	**390E05938A21M**
39/64	0.6094	15.48	11/16-12	5.669	144	8.54	216.9	48	16	**390E06094A21M**
–	0.6102	15.50	M18x2.5	5.669	144	8.54	216.9	48	16	**390M15500A21M**
5/8	0.6250	15.88	–	5.669	144	8.54	216.9	48	16	**390E06250A21M**
–	0.6299	16.00	–	5.669	144	8.54	216.9	48	16	**390M16000A21M**
41/64	0.6406	16.27	–	6.378	162	9.34	237.3	48	18	**390E06406A21M**
–	0.6496	16.50	M18x1.5	6.378	162	9.34	237.3	48	18	**390M16500A21M**
21/32	0.6563	16.67	3/4-10	6.378	162	9.34	237.3	48	18	**390E06563A21M**
–	0.6693	17.00	–	6.378	162	9.34	237.3	48	18	**390M17000A21M**
43/64	0.6719	17.07	3/4-12	6.378	162	9.34	237.3	48	18	**390E06719A21M**
11/16	0.6875	17.46	3/4-16	6.378	162	9.34	237.3	48	18	**390E06875A21M**
–	0.6890	17.50	M20x2.5	6.378	162	9.34	237.3	48	18	**390M17500A21M**
45/64	0.7031	17.86	–	6.378	162	9.34	237.3	48	18	**390E07031A21M**
–	0.7087	18.00	–	6.378	162	9.34	237.3	48	18	**390M18000A21M**
23/32	0.7188	18.26	–	7.087	180	10.22	259.6	50	20	**390E07188A21M**
–	0.7283	18.50	M20x1.5	7.087	180	10.22	259.6	50	20	**390M18500A21M**
47/64	0.7344	18.65	–	7.087	180	10.22	259.6	50	20	**390E07344A21M**
–	0.7480	19.00	–	7.087	180	10.22	259.6	50	20	**390M19000A21M**
3/4	0.7500	19.05	–	7.087	180	10.22	259.6	50	20	**390E07500A21M**
49/64	0.7656	19.45	7/8-09	7.087	180	10.22	259.6	50	20	**390E07656A21M**
–	0.7677	19.50	M22x2.5	7.087	180	10.22	259.6	50	20	**390M19500A21M**
25/32	0.7813	19.84	–	7.087	180	10.22	259.6	50	20	**390E07813A21M**
–	0.7874	20.00	–	7.087	180	10.22	259.6	50	20	**390M20000A21M**

*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14
Key on A10: 1
A10: 2

Sizes not shown are available as non-stocked standards.
When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450"	Part No. = 335E**03450**A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M**07250**A21M

Recommended Drilling Data | Imperial (inch)

ISO	Material	Hardness (BHN)	Speed (SFM)	Feed Rate (IPR) by Diameter								
				0.118 - 0.157	0.161 - 0.236	0.240 - 0.315	0.319 - 0.394	0.398 - 0.472	0.476 - 0.551	0.555 - 0.630	0.634 - 0.709	0.713 - 0.787
P	**Free Machining Steel** 1118, 1215, 12L14, etc.	100 - 150	450	0.007	0.009	0.011	0.013	0.014	0.016	0.018	0.020	0.022
		150 - 200	400	0.005	0.008	0.009	0.011	0.012	0.014	0.016	0.018	0.020
		200 - 250	375	0.004	0.006	0.007	0.009	0.010	0.012	0.014	0.016	0.018
	Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	425	0.007	0.009	0.011	0.013	0.015	0.017	0.019	0.019	0.021
		125 - 175	390	0.006	0.008	0.010	0.012	0.014	0.016	0.018	0.018	0.020
		175 - 225	360	0.005	0.008	0.010	0.011	0.013	0.015	0.017	0.017	0.019
		225 - 275	330	0.004	0.007	0.009	0.010	0.012	0.014	0.016	0.016	0.018
	Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	390	0.006	0.008	0.010	0.012	0.013	0.014	0.016	0.018	0.020
		175 - 225	360	0.005	0.007	0.010	0.012	0.012	0.013	0.015	0.017	0.019
		225 - 275	320	0.004	0.006	0.009	0.011	0.011	0.012	0.014	0.016	0.018
		275 - 325	285	0.003	0.006	0.008	0.010	0.010	0.011	0.013	0.015	0.017
	Alloy Steel 4140, 5140, 8640, etc.	175 - 225	375	0.006	0.008	0.010	0.012	0.013	0.014	0.016	0.018	0.020
		225 - 275	340	0.005	0.007	0.009	0.011	0.012	0.013	0.015	0.017	0.019
		275 - 325	300	0.004	0.006	0.008	0.010	0.011	0.012	0.013	0.016	0.018
		325 - 375	275	0.003	0.005	0.007	0.009	0.010	0.010	0.012	0.014	0.016
	High Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	260	0.005	0.007	0.008	0.011	0.011	0.012	0.013	0.014	0.016
		300 - 350	210	0.004	0.006	0.007	0.009	0.010	0.011	0.012	0.013	0.015
		350 - 400	160	0.003	0.005	0.006	0.008	0.009	0.010	0.011	0.012	0.013
	Structural Steel A36, A285, A516, etc.	100 - 150	360	0.005	0.008	0.009	0.011	0.012	0.013	0.014	0.016	0.018
		150 - 250	320	0.004	0.007	0.008	0.010	0.011	0.012	0.013	0.015	0.017
		250 - 350	270	0.003	0.005	0.007	0.008	0.009	0.010	0.011	0.013	0.015
	Tool Steel H-13, H-21, A-4, 0-2, S-3, etc.	150 - 200	260	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011
		200 - 250	220	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
S	**High Temp Alloy** Hastelloy B, Inconel 600, etc.	140 - 220	120	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011
		220 - 310	90	0.002	0.003	0.003	0.004	0.005	0.006	0.007	0.008	0.009
M	**Stainless Steel 300 Series** 304, 316, 17-4PH, etc.	135 - 185	200	0.004	0.005	0.006	0.007	0.008	0.009	0.011	0.012	0.013
		185 - 275	140	0.003	0.004	0.004	0.005	0.006	0.007	0.009	0.010	0.011
K	**Nodular, Grey, Ductile Cast Iron**	120 - 150	550	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022	0.024
		150 - 200	500	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022	0.024
		200 - 220	475	0.007	0.009	0.011	0.013	0.015	0.017	0.019	0.021	0.023
		220 - 260	430	0.007	0.009	0.011	0.013	0.015	0.017	0.019	0.021	0.023
		260 - 320	400	0.006	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022
N	**Cast Aluminum**	30	1500	0.008	0.010	0.013	0.015	0.017	0.020	0.022	0.024	0.026
		180	1000	0.006	0.008	0.011	0.013	0.015	0.018	0.020	0.022	0.024
	Wrought Aluminum	30	1500	0.008	0.010	0.013	0.015	0.017	0.020	0.022	0.024	0.026
		180	1000	0.006	0.008	0.011	0.013	0.015	0.018	0.020	0.022	0.024

Speed and Feed Adjustment

3.5xD	6xD	9xD
See above chart	0.90	0.75

Recommended Speed and Feed Example

If the recommended speed and feed is 300 SFM and 0.010 IPR, then reduce to 225 SFM and 0.0075 IPR when using a 9xD tool

300 • 0.75 = 225 SFM	0.010 • 0.75 = 0.0075 IPR

Calculations

Value	Formula
IPM	RPM • IPR
SFM	RPM • 0.262 • DIA
RPM	(SFM • 3.82) / DIA

IMPORTANT: The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is available through our Application Engineering department.

Recommended Drilling Data | Metric (mm)

ISO	Material	Hardness (BHN)	Speed (M/min)	Feed Rate (mm/rev) by Diameter								
				3.00 - 4.00	4.01 - 6.00	6.01 - 8.00	8.01 - 10.00	10.01 - 12.00	12.01 - 14.00	14.01 - 16.00	16.01 - 18.00	18.01 - 20.00
P	**Free Machining Steel** 1118, 1215, 12L14, etc.	100 - 150	137	0.18	0.23	0.28	0.33	0.36	0.41	0.46	0.51	0.56
		150 - 200	122	0.13	0.20	0.23	0.28	0.30	0.36	0.41	0.46	0.51
		200 - 250	114	0.10	0.15	0.18	0.23	0.25	0.30	0.36	0.41	0.46
	Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	130	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.48	0.53
		125 - 175	119	0.15	0.20	0.25	0.30	0.36	0.41	0.46	0.46	0.51
		175 - 225	110	0.13	0.20	0.25	0.28	0.33	0.38	0.43	0.43	0.48
		225 - 275	101	0.10	0.18	0.23	0.25	0.30	0.36	0.41	0.41	0.46
	Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	119	0.15	0.20	0.25	0.30	0.33	0.36	0.41	0.46	0.51
		175 - 225	110	0.13	0.18	0.25	0.30	0.30	0.33	0.38	0.43	0.48
		225 - 275	98	0.10	0.15	0.23	0.28	0.28	0.30	0.36	0.41	0.48
		275 - 325	87	0.08	0.15	0.20	0.25	0.25	0.28	0.33	0.38	0.43
	Alloy Steel 4140, 5140, 8640, etc.	175 - 225	114	0.15	0.20	0.25	0.30	0.33	0.36	0.41	0.46	0.51
		225 - 275	104	0.13	0.18	0.23	0.28	0.30	0.33	0.38	0.43	0.48
		275 - 325	91	0.10	0.15	0.20	0.25	0.28	0.30	0.33	0.41	0.46
		325 - 375	84	0.08	0.13	0.18	0.23	0.25	0.25	0.30	0.36	0.41
	High Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	79	0.13	0.18	0.20	0.28	0.28	0.30	0.33	0.36	0.41
		300 - 350	64	0.10	0.15	0.18	0.23	0.25	0.28	0.30	0.33	0.38
		350 - 400	49	0.08	0.13	0.15	0.20	0.23	0.25	0.28	0.30	0.33
	Structural Steel A36, A285, A516, etc.	100 - 150	110	0.13	0.20	0.23	0.28	0.30	0.33	0.36	0.41	0.46
		150 - 250	98	0.10	0.18	0.20	0.25	0.28	0.30	0.33	0.38	0.43
		250 - 350	82	0.08	0.13	0.18	0.20	0.23	0.25	0.28	0.33	0.38
	Tool Steel H-13, H-21, A-4, 0-2, S-3, etc.	150 - 200	79	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.28
		200 - 250	67	0.05	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25
S	**High Temp Alloy** Hastelloy B, Inconel 600, etc.	140 - 220	37	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.28
		220 - 310	27	0.05	0.08	0.08	0.10	0.13	0.15	0.18	0.20	0.23
M	**Stainless Steel 300 Series** 304, 316, 17-4PH, etc.	135 - 185	61	0.10	0.13	0.15	0.18	0.20	0.23	0.28	0.30	0.33
		185 - 275	43	0.08	0.10	0.10	0.13	0.15	0.18	0.23	0.25	0.28
K	**Nodular, Grey, Ductile Cast Iron**	120 - 150	168	0.20	0.25	0.30	0.36	0.41	0.46	0.51	0.56	0.61
		150 - 200	152	0.20	0.25	0.30	0.36	0.41	0.46	0.51	0.56	0.61
		200 - 220	145	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	0.58
		220 - 260	131	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	0.58
		260 - 320	122	0.15	0.20	0.25	0.30	0.36	0.41	0.46	0.51	0.56
N	**Cast Aluminum**	30	457	0.20	0.25	0.33	0.38	0.43	0.51	0.56	0.61	0.66
		180	305	0.15	0.20	0.28	0.33	0.38	0.46	0.51	0.56	0.61
	Wrought Aluminum	30	457	0.20	0.25	0.33	0.38	0.43	0.51	0.56	0.61	0.66
		180	305	0.15	0.20	0.28	0.33	0.38	0.46	0.51	0.56	0.61

Speed and Feed Adjustment

3.5xD	6xD	9xD
See above chart	0.90	0.75

Recommended Speed and Feed Example

If the recommended speed and feed is 91 M/min and 0.25 mm/rev, then reduce to 68 M/min and 0.19 mm/rev when using a 9xD tool

91 • 0.75 = 68 M/min	0.25 • 0.75 = 0.19 mm/rev

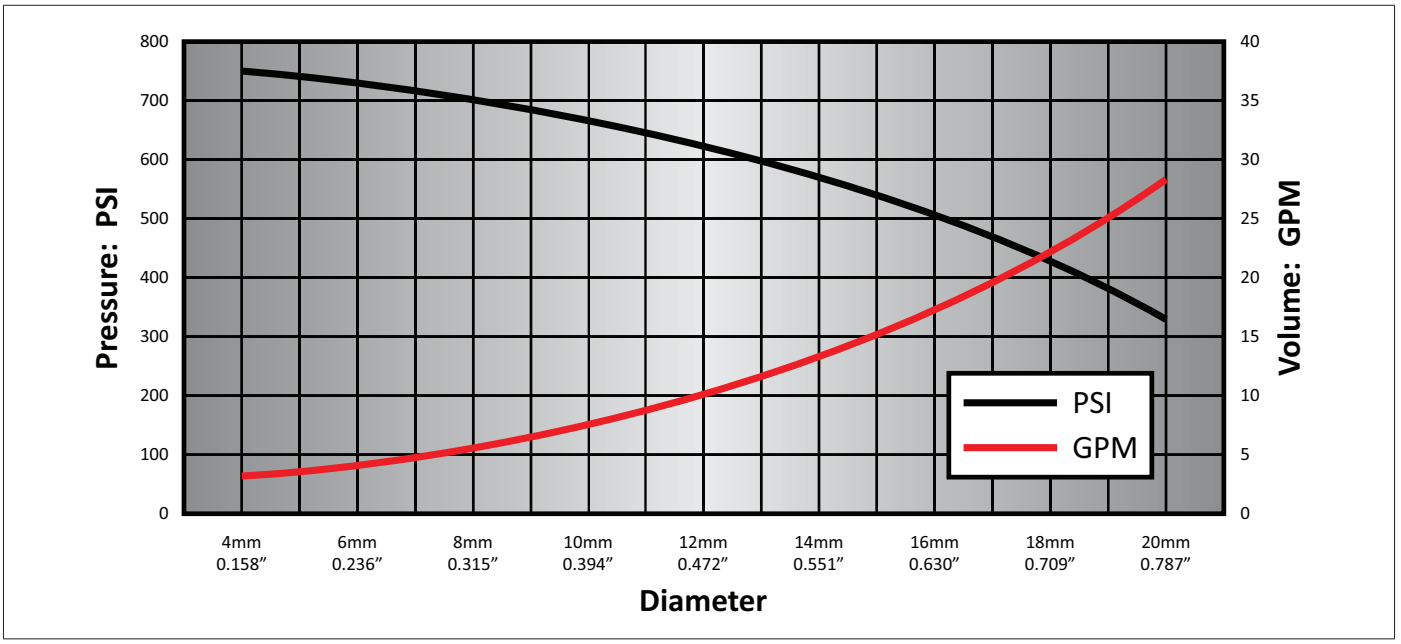
Calculations

Value	Formula
mm/min	RPM • mm/rev
M/min	RPM • 0.003 • DIA
RPM	(M/min • 318.47) / DIA

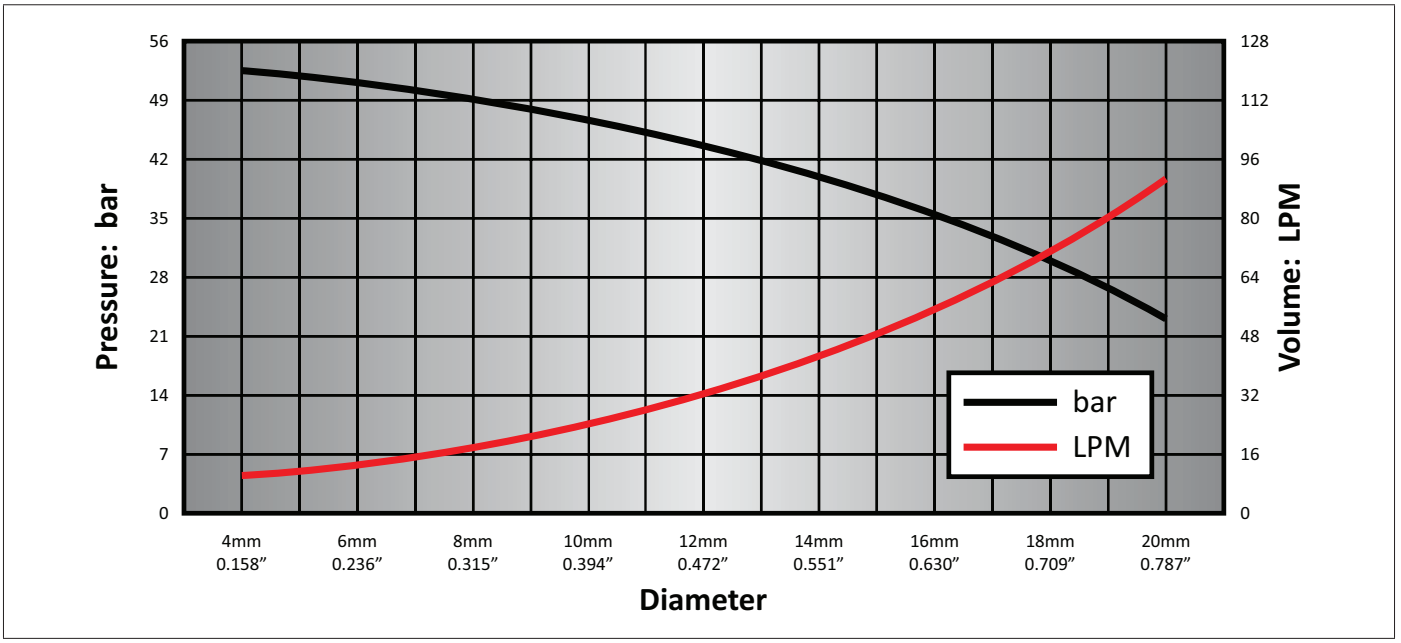
IMPORTANT: The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is available through our Application Engineering department.

Coolant Recommendations

Imperial (PSI)



Metric (bar)



Coolant Adjustment

Drill Length	Pressure and Flow
3.5xD	See above chart
6xD	1.5
9xD	2.0

Coolant Recommendation Example

If the recommended coolant pressure and flow is 600 PSI and 12 GPM for a 3xD tool, the adjusted pressure and flow for a 9xD tool would be:

600 • 2 = 1200 PSI	12 • 2 = 24 GPM

IMPORTANT: The coolant pressure and flow rate recommendations above represent a good approximation to obtain optimum tool life and chip evacuation at Allied recommended speeds and feeds. If lower coolant capabilities exist in a drilling application, the ASC 320 drilling system will still function at reduced penetration rates. Contact our Application Engineering Department for a more specific recommendation of coolant requirements and/or speeds and feeds.

Notes

Guaranteed Test / Demo Application Form

Distributor PO #	

The following must be filled out completely before your test will be considered

Distributor Information

Company Name: _____

Contact: _____

Account Number: _____

Phone: _____

Email: _____

End User Information

Company Name: _____

Contact: _____

Industry: _____

Phone: _____

Email: _____

Current Process

List all tooling, coatings, substrates, speeds and feeds, tool life, and any problems you are experiencing

_____

_____

Test Objective

List what would make this a successful test (i.e. penetration rate, finish, tool life, hole size, etc.)

_____

_____

Application Information

Hole Diameter: _____ in/mm

Tolerance: _____

Material: _____
(4150 / A36 / Cast Iron / etc.)

Pre-existing Diameter: _____ in/mm

Depth of Cut: _____ in/mm

Hardness: _____
(BHN / Rc)

Required Finish: _____ RMS

State: _____
(Casting / Hot rolled / Forging)

Machine Information

Machine Type: _____
(Lathe / Screw machine / Machine center / etc.)

Builder: _____
(Haas, Mori Seiki, etc.)

Model #: _____

Shank Required: _____
(CAT50 / Morse taper, etc.)

Power: _____ HP/KW

Rigidity:
- ☐ Excellent
- ☐ Good
- ☐ Poor

Orientation:
- ☐ Vertical
- ☐ Horizontal

Tool Rotating:
- ☐ Yes
- ☐ No

Thrust: _____ lbs/N

Coolant Information

Coolant Delivery: _____
(Through tool / Flood)

Coolant Pressure: _____ PSI / bar

Coolant Type: _____
(Air mist, oil, synthetic, water soluble, etc.)

Coolant Volume: _____ GPM / LPM

Requested Tooling

QTY	Item Number

QTY	Item Number

ALLIED MACHINE & ENGINEERING

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ALLIED MACHINE & ENGINEERING

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Complete information as to operating conditions, machine, setup, and the application of cutting fluid should accompany any product returned for inspection. This warranty shall not apply to any Allied Machine products which have been subjected to misuse, abuse, improper operating conditions, improper machine setup or improper application of cutting fluid or which have been repaired or altered if such repair or alteration, in the judgement of Allied Machine, would adversely affect the performance of the product.

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